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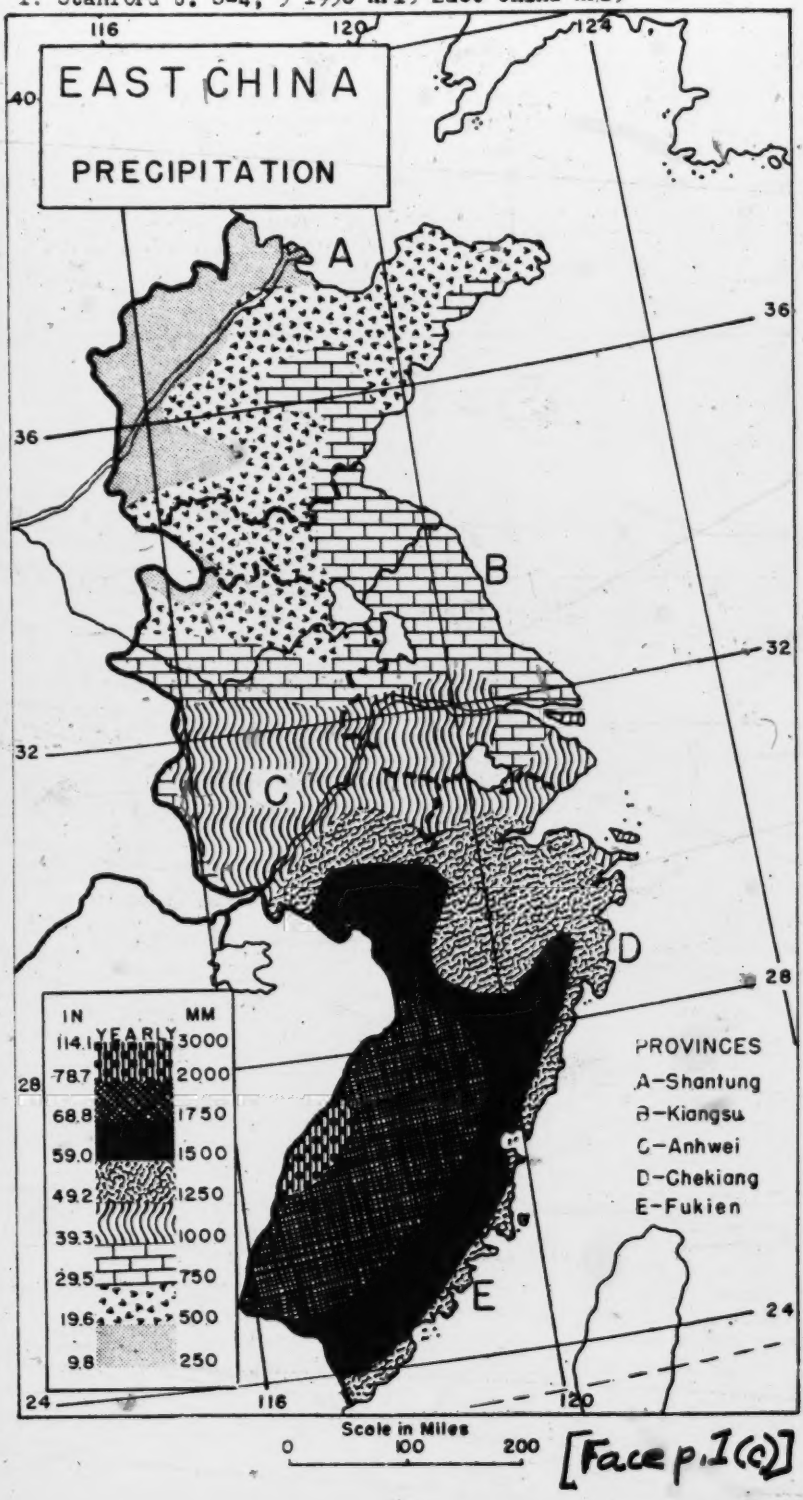

[Face p. I(c)]

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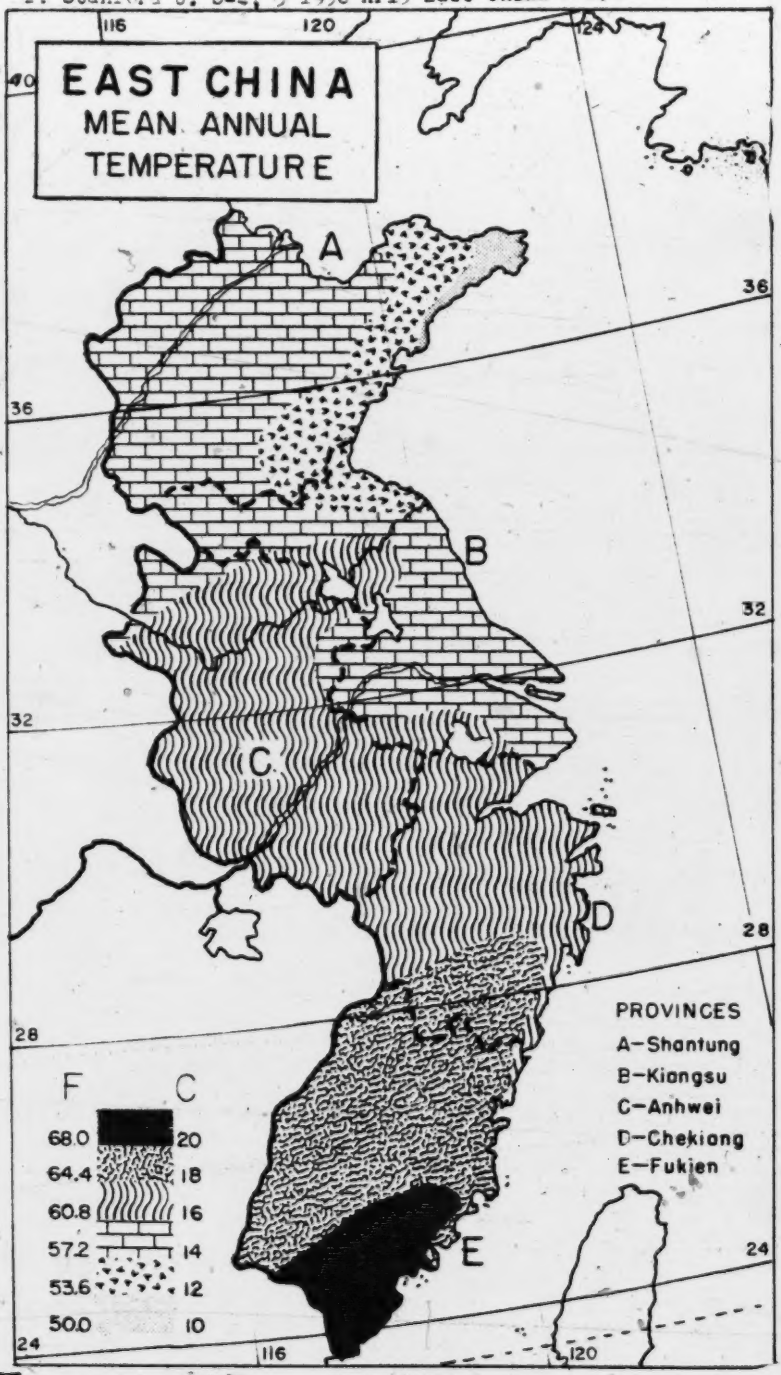

[Facing p. 1(d)]

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133 Rocky inlets and offshore islands mark the shoreline and provide many potential sites for ports; in this way it resembles the coasts of Japan and New England.[16] Offshore near Chekiang, for example, there are some 1,800 islands, the most important of which is the Chou-shan (Chusan) group. The Hai-t'an, Mei-chou, Amoy, Quemoy, and Tung-shan islands off the Fukien coast merit mention although their maritime value is less significant. The ports which have been developed to various degrees are: Hsiang-shan, San-men, T'ai-chou, and Wen-chou in Chekiang; and Sansha, Fu-chou, Ch'üan-chou, and Amoy in Fukien.

CLIMATE

• 132 In Eastern China, north of the Yellow River, the North China plain climate prevails. Winters are extremely cold; and in summer the temperature frequently rises above 35° C. (95°F.). In the Hwai and Yangtze River area, the four seasons of the year are clearly defined and are fairly equal in length. Rainfall in this area is evenly distributed throughout the year. A winter with about 11 per cent of the annual precipitation is considered normal.[17] These

16. Cressey, op. cit., p. 334.
17. Ch'u, Shao-t'ang, op. cit., pp. 75-76.

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132 climatic conditions, along with fertile soil and reliable natural irrigation, have enabled the inhabitants to make extensive agricultural development and have encouraged them to branch out into all types of industrial and commercial activity. Shanghai's rapid development in the last century, from an inconspicuous fishing settlement to a city of well over 5,000,000 people, shows that good soil and climate can counterbalance the lack of significant industrial resources in the area.[18] Foreign efforts have been a prime factor in harnessing these favorable factors for the continued growth of Shanghai.

South of the Ch'ien-t'ang River the summers are long, ranging from five to eight months, but are never extremely hot. Due to the moderating effect of the nearby ocean, the temperature seldom goes above 29°C. (84°F.) in the valleys, and never below 46° F. during the short winter. Winter in the mountains in western Fukien and southern Chekiang is considerably cooler.[19]

The heavy rainfall in the intermountain areas of central Fukien is frequently augmented by typhoons in July and September. One such

18. Cressey, op. cit., p. 301.
19. Ch'u, Shao-t'ang, op. cit., pp. 144-45.

•132 storm can easily pour as much as 100 millimeters (4 in.) of rain into the valleys in a single day. During the same season typhoons and high winds may also cause damage, and the area of their threat extends as far north as Shanghai.

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Table 1. Climate at Selected Localities*

	Average Temperature (F.)		Rainfall (Inches)	
	January	July	Annual Average	Rainy Season
Tsingtao (Shantung Peninsula)	31	75	47	May-August
Shanghai (eastern Kiangsu)	35	81	45	June-August
Nanking (western Kiangsu)	34	82	42	June-August
Hangchow (northern Chekiang)	41	84	59	April-August
Wen-chou (southeastern Chekiang)	47	83	65	June-September
Huo-ch'iu (western Anhwei)	34	82	42	June-July
Wu-hu (eastern Anhwei)	39	83	48	June-July

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(Table 1 continued)

P'u-ch'eng (northern Fukien)	45#	68	59	June
Foochow (eastern Fukien)	53	84	56	June-September
Amoy (southern Fukien)	59	85	47	May-August

* based on Huang Chin-t'ao and others, Fu-chien Ching-chi Kai-k'uang [The Economic Situation in Fukien], Fukien, Provincial Government, 1948; Cressey, op. cit., pp. 76-79.

\# The coldest spot in Fukien; the lowest winter temperature recorded here is 19°F.

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gain. As long as water transport retains its basic place in the Chinese economy, a harbor for ocean ships will be maintained at Shanghai as the commercial center of the Yangtze basin.

Relief and Climate

The site has only two advantages of importance: it is almost completely flat, and it has a more favorable climate than rival south China ports. Ample level ground was useful during the purely commercial phase of the city's development in allowing adequate space for storage of goods, for half of China's foreign trade passed through Shanghai from 1865 on, but it was more important in allowing the development of manufacturing after 1895. The commercial center which began in an area of 43 acres along the Whangpoo in 1843, demarcated and defended by creeks, was able to grow outward toward the west, south, and north as both political and economic conditions provided the impetus for metropolitan industrial development. Level ground continues unbroken within a twenty-mile radius of the city. While the site's liability to floods is a notable disadvantage, level ground must in general be counted an asset, especially as against the lack of it in Hong Kong, Foochow, Amoy, and other south China ports.

Shanghai's climate is influenced alternately by cold dry air from inner Asia and Siberia, and by warm moist Pacific air; it is tropical for one third of the year and temperate for two thirds. Rainfall averages 45 inches annually, 14 inches of which falls in June and July, but with no very marked seasonal concentration. July and August are uncomfortably tropical, and while rains keep the temperature below 90° for at least a quarter of these two months, the relative humidity throughout this period averages 84 per cent. Temperatures rarely exceed 98°. Vital statistics for foreign residents of the China treaty ports included in the yearly medical reports published since 1870 by the Maritime Customs give Shanghai, with a death rate averaging 16 per thousand annually for the period 1870–1930, a relatively good record. Most of the foreign residents considered it among the healthier treaty ports despite its uncomfortable summer, during which as many of them as were able left the city for the central mountain belt or the Shantung beaches. The accompanying table com-

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132 pares temperatures and relative humidity at Shanghai with selected cities in different climatic regions.

	Mean Annual Temperature	Mean Annual Rel. Humidity	Dec.-Jan.-Feb.		June-July-August	
			Temp.	R.H.	Temp.	R.H.
New York	54	60	30	61	79	62
London	49	79	39	82	61	76
Canton	64	82	48	56	83	89
Shanghai	59	78	39	36	78	85

Shanghai's is a moderate climate compared with south China, especially in respect of the greater effect in winter of the Siberian high, and with daily and seasonal changes in which Chinese and foreigners can work under reasonably favorable and familiar conditions.

361 In sum however, the growth of Shanghai must be regarded as an illustration of the extent to which the advantages of an exceptionally favorable location can overcome the disadvantages of an exceptionally unfavorable site. While most of the city's site problems are common to many delta ports, its locational advantages are unique. These will now be examined in the following chapter.

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NINE

How the City is Fed

Agriculture and Transport in the Delta

The portion of the Yangtze delta which we have called the fertile triangle (Chapter Four) stands out in dramatic relief as one of the richest agricultural areas in China. Maps 7, 10, and 11 show its place in the pattern of agricultural occupance and rice production. Shanghai lies at the apex of this largest area of high-fertility soil in China with adequate rainfall, and indeed so large a city could have developed nowhere else before the industrial revolution. With railway development still in its infancy in China, Shanghai has been able to maintain itself as a city of nearly four millions because it is located in what is in effect a huge truck garden.

The soil of the delta is of course alluvium, and its correspondingly high fertility is implemented by its fortunate median position between the semi-arid north and the humid south. Between Hangchow on the south and the Huai River on the north, average annual rainfall decreases from 58 inches to 34 inches. South of the line of the Huai River, leaching has removed much of the original lime content of the soils, but the prevailing gentle quality of the rains in the delta area and their relatively even distribution over the year * has prevented removal of all the lime. The line of the Huai roughly marks the division between the wheat-kaoliang-millet crop economy of the semi-arid north and the rice-tea-silk complex of the humid south, although the two major agricultural patterns overlap in the delta to some extent. Below Hangchow, rainfall increases sharply, and most of the soils of south China are thoroughly leached.

The fertile triangle thus avoids both the inadequate rainfall of

* Rainfall is concentrated from March through August, but no month has more than nine inches and no month less than two.

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the areas immediately north and the leaching of the areas immediately south. It shares with most of south China however a soil which has a high clay content and is thus suitable for wet-rice cultivation in paddies. Of equal importance for the soil with the amount, distribution, and nature of the rainfall is the continual renewal of the alluvium by the Yangtze and its tributaries. While in the absence of frequent floods covering the whole of the area this renewal cannot keep pace with the soil exhaustion attendant on 2,000 years of farming, the material which the rivers bring down and deposit is a highly fertile mixture of well-varied origin containing in particular considerable calcium.[1]

Rainfall over the fertile triangle as a whole averages about 43 inches annually, and falls largely in gentle showers. The peak in late April, May, and June is especially favorable to agriculture, coming as it does during the planting season for most crops in this area and continuing through the first important weeks of early growth. These are the so-called plum rains (*pai-yü*), accompanying weak cyclonic storms whose effect is somewhat lessened by the counter influence of the monsoon wind system of east Asia. The growing season is long, averaging 287 days at Shanghai between killing frosts, 291 at Nanking, and 307 at Hangchow.

Relief forms almost no obstacle to cultivation. For the triangle as a whole, about 80 per cent of the total land area is cultivated (eliminating the area covered by lakes), the highest figure for an area of comparable size in China, according to J. L. Buck's figures.* The

* J. L. Buck, *Land Utilization in China* (1937). This is a highly statistical study, whose limitations are obvious in dealing with a largely illiterate peasant society where accurate or complete statistical information is unobtainable. Buck's figures have often been used too literally, but since they are virtually the only ones available on a national basis they may be used to advantage if it is realized that despite their detail they are no more than approximations, arrived at by Western methods whose applicability to the traditional Chinese society is questionable. Their safest use is as estimates of orders of magnitude. Subsequent citations here from Buck's work should be read with these considerations in mind.

Buck's figures have the advantage of considerable regional detail. Since the discussion of food production and marketing here is largely limited to the fertile triangle, Buck's statistics are more readily usable than others gathered or presented on a provincial basis. However, reference should be made to some of these more general studies by Chinese, of agriculture and of rice production, which bear on the problems treated here, and which I have used in a general way in addition

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picul (the Shanghai rice picul during this period equalled 172 pounds); b. (out-province rice) CN$12.40 per picul; c. (foreign rice) CNC$12.30 per picul.[17] At these levels the composition of the rice supply tended to remain stable, with local rice accounting for over 80 per cent of the total. Shanghai in general prefers to eat local rice even when its price rises slightly above that of foreign rice, as usually happens during the local planting season and at certain other times (see below). Foreign rice is a different type from the local product and there is prejudice in Shanghai against its taste and cooking properties. Any great change in these relative prices, however, upsets the balance. When foreign rice is relatively cheap, its Shanghai sales are large, but as fresh supplies continue to be ordered by the merchant groups, the Saigon price rises and the normal price and supply situation is restored.

2. The planting season for rice in the delta area, which lasts from early May to early June. During this period, movements of rice to Shanghai from the delta virtually cease, and the city draws on rice it holds in storage, plus foreign imports. The fact that the planting season usually coincides with the wet period of the plum rains means that the Shanghai price of rice rises sharply from late May to mid-June. New supplies of local rice come into the Shanghai market in early July (i.e., from the previous year's crop, which has been stored in the local collecting centers but which is not moved to Shanghai during the planting season, the greatest peak labor period of the agricultural year). The Shanghai price regains its normal level as a rule before the end of the month.

3. The weather. Hot and/or humid weather tends to rot stored rice, and thus depresses the price by forcing sales, or stimulates it by jeopardizing what is stored. Drought seldom affects harvests seriously in the delta with its network of canals to supply irrigation water. The greatest effect of rain is on the day-to-day movement of rice from local production areas to the Shanghai market. The delta waterways are easily flooded over their banks by rain and wind, and by both in combination with the tide in the stretches which receive tidal inflow from the Yangtze or the Whangpoo.*

* This might be deduced from the discussion of the delta above in Chapter Three, and it is referred to specifically in the two journals cited for this account of the rice

132 435 438 505 The boatmen on these waterways usually refuse to load or unload rice when it is raining (whether out of regard for their own safety or for that of their cargo is not clear), and the flow of rice to Shanghai stops almost entirely whenever it rains. The Shanghai rice market, including foreign and out-province rice, reacts with great sensitivity to the rain situation in the city, price changes for rice from all sources often following changes in the weather as closely as an hour.* The role of the weather in the Shanghai rice market as a whole underscores the fact that local sources of rice hold the commanding position, and that the rice moves to the city largely by boat. The monthly reports on the rice market refer repeatedly to water transport connecting Shanghai with the rice-producing areas of south central Kiangsu, but very little mention is made of railway transport of rice during the entire period 1920–1936. Highway transport of rice is not mentioned at all. The dominance of water is so marked that these monthly reports lay great stress on the weather, and conclude in one case that "Rain and wind make a great difference to the rice merchant's heart."[18]

527 435 438 4. Traditional festivals, especially the Chinese New Year (a lunar festival occurring as a rule in early February). Their effects may be summarized as follows: a. since the New Year is the time for settling of accounts as well as for feasting, the farmers need cash and sell their rice; the price falls as a result at the beginning of the festival period; b. however, the holiday on the farms decreases the amount of rice collected and transported to inland centers as the festival continues, thus counterbalancing the earlier selling; c. banditry resulting from inability to pay debts slows or stops move-

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market on an average of ten or twelve times a year, principally from March through July.

* According to records kept by the Public Works Department of the International Settlement at Shanghai (printed each year in the Annual Reports of the Municipal Council from 1920 to 1939), rainy days occurred in the city from 1920 to 1939 on an average as follows:

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
Number of days on which some rain fell	3	4	6	6	8	14	7	5	5	4	4	1
Number of days with rain continuously 6 A.M.-6 P.M.	1	2	4	4	5	8	4	3	3	2	1	1